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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,967	11/24/2003	Vladimir Grushin	PE0649USDIV7	5220
23906	7590	12/06/2005	EXAMINER	
E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			SMOOT, STEPHEN W	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 12/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/720,967

Applicant(s)

GRUSHIN ET AL.

Examiner

Stephen W. Smoot

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 12 and 13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 12 and 13 is/are rejected.
- 7) ☒ Claim(s) 5-8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is in response to applicant's amendment filed on 13 July 2005.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the letter by Baldo et al. in Nature (vol. 403, 17 February 2000, pp. 750-753 – from applicant's IDS) in view of the communication by Dedeian et al. in Inorganic Chemistry (vol. 30, 1991, pp. 1685-1687 – from applicant's IDS).

Regarding claim 1, Baldo et al. disclose an organic electronic device including the metal complex $\text{Ir}(\text{ppy})_3$ wherein ppy is 2-phenylpyridine at 10% in CBP, a hole transport layer of TPD (N,N'-diphenyl-N,N'-bis(3-methylphenyl)-[1,1'-biphenyl]-4,4'-diamine – as further limited by instant claim 12), and an electron transport layer of Alq_3

(tris(8-hydroxyquinolato)aluminum – as further limited by instant claim 13) (see Fig. 1 and page 751).

However, Baldo et al. do not expressly teach or suggest that their $\text{Ir}(\text{ppy})_3$ complex can include ligands with at least one of R_1 to R_8 having a fluorine-containing substituent selected from the group as claimed in applicant's claim 1.

Dedeian et al. disclose fluoro- and trifluoromethyl-substituted 2-phenylpyridines as light-emitting materials, as shown in the upper, right-hand corner of p. 1686. Table I, on the same page, shows the groups with which the 2-phenylpyridine is substituted. In particular, the compounds labeled $\text{Ir}(4\text{-F-ppy})_3$ and $\text{Ir}(4\text{-F}_3\text{C-ppy})_3$ read on the presently claimed compounds. None of adjacent pairs of R_1 - R_4 and R_5 - R_8 are joined. The "F" and "F₃C" groups read on the presently claimed "at least one of R_1 - R_8 is selected from F, $\text{C}_n\text{F}_{2n+1}$, $\text{OC}_n\text{F}_{2n+1}$, and OCF_2X , where $n=1$ -6 and $\text{X}=\text{H}$, Cl, or Br." In the instant case, the first two of the group are anticipated; F₃C indicates that $n=1$. Because the ligand is of phenylpyridine, $\text{A} = \text{C}$.

Regarding claim 2, in the Dedian et al. ppy ligands, x is 1, y is 0, and z is 0.

Regarding claim 3, in the Dedian et al. ppy ligands, none of R_1 - R_8 is a nitro substituent.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the substituted ppy ligands of Dedian et al. as those in the Baldo et al. $\text{Ir}(\text{ppy})_3$ complex to modify the wavelength of emission.

In this regard, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. The selection of a known material

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based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol. "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.). (See MPEP 2144.07.)

Further regarding claim 1, although the amount of Ir(ppy)_3 is not taught in either of Baldo et al. or Dedian et al. to be greater than 20%, it would be a matter of routine optimization to choose greater than 20% to increase the intensity of light emitted by the device. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective

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variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious). In this case there exists no evidence of record that the amount of the Ir(ppy)₃ complex is critical to the practice of the invention. Rather the applicant's originally filed disclosure teaches away from any such criticality by claiming greater than 20% (originally filed claim 1) or less than 20% (originally filed claim 10), essentially any amount works. Accordingly, it cannot be held novel and non-obvious to choose any amount of a quantity of a known compound absent some unexpected result in the organic electronic device fabricated, according to precedent.

3. Claims 1-3, 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the letter by Baldo et al. in *Nature* (vol. 403, 17 February 2000, pp. 750-753 – from applicant's IDS) in view of the article by Djurovich et al. in *Polymer Preprints* (vol. 41, 2000, pp. 770-771 – from applicant's IDS).

Regarding claim 1, Baldo et al. disclose an organic electronic device including the metal complex Ir(ppy)₃ wherein ppy is 2-phenylpyridine at 10% in CBP, a hole transport layer of TPD (N,N'-diphenyl-N,N'-bis(3-methylphenyl)-[1,1'-biphenyl]-4,4'-diamine – as further limited by instant claim 12), and an electron transport layer of Alq₃ (tris(8-hydroxyquinolato)aluminum – as further limited by instant claim 13) (see Fig. 1 and page 751).

However, Baldo et al. do not expressly teach or suggest that their Ir(ppy)₃ complex can include ligands with at least one of R₁ to R₈ having a fluorine-containing substituent selected from the group as claimed in applicant's claim 1.

Djurovich et al. disclose an organic LED (see Introduction, first paragraph) having fluorine-substituted ppy as the Ir ligands and reading on the compounds of claims 1-3. Djurovich et al. further teach that the solubility in organic solvents is improved by the addition of the fluorine substituents (paragraph bridging pp. 770-771).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to substitute the ppy ligands of Baldo et al. with fluorine to improve the solubility of the ppy in the organic solvents used to manufacture the LED as taught in Djurovich et al. Note that both Baldo et al. and Djurovich et al. use spin-on processing of the Ir-complex in organic solvents to form the LED, so Baldo et al. would benefit from the increased solubility taught by Djurovich et al.

Further regarding claim 1, although the amount of Ir(ppy)₃ is not taught in either of Baldo et al. or Djurovich et al. to be greater than 20%, it would be a matter of routine optimization to choose greater than 20% to increase the intensity of light emitted by the device. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is

obvious). In this case there exists no evidence of record that the amount of the Ir(ppy)₃ complex is critical to the practice of the invention. Rather the applicant's originally filed disclosure teaches away from any such criticality by claiming greater than 20% (originally filed claim 1) or less than 20% (originally filed claim 10), essentially any amount works. Accordingly, it cannot be held novel and non-obvious to choose any amount of a quantity of a known compound absent some unexpected result in the organic electronic device fabricated, according to precedent.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the letter by Baldo et al. in Nature (vol. 403, 17 February 2000, pp. 750-753 – from applicant's IDS) and the communication by Dedeian et al. in Inorganic Chemistry (vol. 30, 1991, pp. 1685-1687 – from applicant's IDS) as applied to claim 1 above, and further in view of Baldo et al. (WO 00/70655).

As shown above, the combination of the letter by Baldo et al. in Nature and the communication by Dedeian et al. in Inorganic Chemistry has all of the limitations as set forth in claim 1 of the applicant's invention. However, this combination does not expressly teach or suggest that the F₃C substituent, as taught by Dedeian et al., be located in the R₃ position, which is a further limitation to claim 1 as set forth in claim 4 of the applicant's invention. Baldo et al. (WO 00/70655), like Dedeian et al., disclose substituted phenylpyridine ligands for iridium complexes, and further teach that the substituents can be located in any position on either ring of the phenylpyridine ligand (see pages 14-15).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to further combine the combination of the letter by Baldo et al. in Nature and the communication by Dedeian et al. in Inorganic Chemistry with Baldo et al. (WO 00/70655) in order to locate the F₃C substituent of Dedeian et al. in any position on either ring of the phenylpyridine ligand, as suggested by Baldo et al. (WO 00/70655), to thereby obtain desired emissive properties. Baldo et al. (WO 00/70655) recognize that such a modification is within the skill level of the art (see page 14, lines 11-13) and can advantageously be used to alter emissive properties like color emission or carrier transport rate (see page 15, lines 1-4).

Allowable Subject Matter

5. Claims 5-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: Claims 5-8 would be allowable because the prior art of record does not teach or suggest, in combination with the other claim limitations, an organic electronic device that includes an emitting layer with at least 20 weight % of the emitting layer being an iridium complex, wherein ligands corresponding to the iridium complex have the

structure (I) as set forth in applicant's claim 1, wherein R_3 is CF_3 , and wherein at least one other position on the ligand has a fluorine-containing substituent.

Response to Arguments

7. Applicant's arguments filed 13 July 2003 (see pages 4-6) have been fully considered but they are not persuasive.

Regarding the above rejections of claims 1-3, 12-13, the applicant argues that a *prima facie* case of obviousness has not been established with respect to the applicant's limitation, as set forth in claim 1, that the emitting layer contains at least 20 weight % of the iridium complex. However a *prima facie* case of obviousness has been established, as indicated in the prior Office action and as indicated above, on the basis of routine optimization of a known process. Further, as indicated in the prior Office action and as indicated above, the applicant needs to show that their claimed range of greater than 20 % achieves unexpected results, which are different in kind and not merely in degree from the results of the prior art. Also, as indicated in the prior Office action and as indicated above, Djurovich et al. disclose improved solubility in organic solvents by using fluorine substituents (paragraph bridging pp. 770-771), which would suggest that a known higher concentration of iridium complex has already been established in the art.

8. Applicant's arguments filed 13 July 2003 (see pages 5-6) with respect to the rejection of claims 4-8 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection for claim 4 has been made in view of the communication by Dedeian et al. in Inorganic Chemistry as set forth above.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Thompson et al. (US 6,830,828 B2) teach an iridium phenylpyridine complex that may include substituents located in various positions of the ligand in order to desirably alter emissive properties. Forrest et al. also teach an iridium phenylpyridine complex that may include substituents located in various positions.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS


STEPHEN W. SMOOT
PRIMARY EXAMINER